

# All-Suture Anchors in Labral Repair Scientific Update



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Use of all-suture anchors in arthroscopic labral repair is well documented in biomechanical and clinical literature. All-suture anchors have two distinct advantages:

1. They require smaller bone sockets for placement. These anchors can be placed using a 1.4 mm to 1.8 mm bone tunnel, whereas hard body anchors may require a 2.4 mm to 3.0 mm tunnel. This allows for the placement of more anchors, increasing fixation points and minimizing the risk of recurrence.
2. They can be placed through curved guides, facilitating placement through standard anterior portals and reducing the risk of glenoid perforation.

## Biomechanical Studies

[Cyclic and load-to-failure properties of all-suture anchors in human cadaveric shoulder glenoid bone.](#) *Arthroscopy*. 2019;35(7):1954-1959.e4. doi:10.1016/j.arthro.2019.01.022

- Using 13 human cadavers, this study compared the biomechanical properties of 4 all-suture anchors varying in size from 1.4 mm to 1.8 mm.
- Displacement after 100 cycles varied between 1.4 mm and 3.6 mm based on anchor type.
- Load to failure varied between 144 N and 191 N based on anchor type.

### Takeaway

- **Biomechanical properties of all-suture anchors vary based on anchor design, but ultimate load-to-failure values met acceptable clinical thresholds.**

[Biomechanical evaluation of classic solid and novel all-soft suture anchors for glenoid labral repair.](#) *Arthroscopy*. 2012;28(5):642-648. doi:10.1016/j.arthro.2011.10.024

- Using 12 human cadavers, this study compared the biomechanical properties of a 1.4 mm all-suture anchor to a 3.0 mm hard body anchor.
- Load to failure was similar between the two anchor types.
- Load to 2 mm of displacement was 84 N with the hard body anchor compared to 39 N with the all-suture anchor ( $P < .001$ ).

### Takeaways

- **Load to failure was similar between hard-body and all-suture anchors.**
- **Load to 2 mm of displacement is lower with a 1.4 mm all-suture anchor compared to a 3.0 mm hard-body anchor.**
- **Note: This evaluation compared single-anchor repair methodology, while standard Bankart repairs require multiple anchors. Thus, it is difficult to extrapolate the data on displacement to a multiple-anchor repair.**



Erickson J,  
Chiarappa F,  
Haskel J,  
Rice J,  
Hyatt A,  
Monica J,  
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[Biomechanical comparison of a first- and a second-generation all-soft suture glenoid anchor.](#) *Orthop J Sports Med.* 2017;5(7):2325967117717010. doi:10.1177/2325967117717010

- Using 20 cadavers, this study compared fixation of 2 all-suture anchors to a hard-body anchor.
- Load to 2 mm of displacement was similar between groups (35 N to 42 N).
- Load to failure was higher in the all-suture groups compared to the hard-body anchor group (171.52 N ± 14.25 N [Juggerknot] vs 182.51 N ± 14.03 N [Suturefix] vs 132.87 N ± 14.25 N [Bioraptor]).

#### Takeaway

- **Biomechanical properties of all-suture anchors are similar to the hard-body anchors despite smaller anchor size.**

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[Biomechanical evaluation of knotless and knotted all-suture anchor repair constructs in 4 Bankart repair configurations.](#) *Arthroscopy.* 2020;36(6):1523-1532. doi:10.1016/j.arthro.2020.01.046

- Using 30 cadavers, this study was a comparison of knotless and knotted all-suture anchors using various stitch configurations for Bankart repair.
  - 6 cadavers were used to test native state
  - 6 simple configuration knotted constructs – standard 1.8 mm FiberTak® anchor
  - 6 simple configuration knotless constructs – 1.8 mm Knotless FiberTak anchor
  - 6 mattress configuration knotless constructs – standard 1.8 mm FiberTak anchor
  - 6 mattress configuration knotless constructs – 1.8 mm Knotless FiberTak anchor
- There was no difference between knotless and knotted constructs in load to failure.
- Strain of the native state was most closely reproduced by the knotless mattress configuration, which was the only repair that did not result in increased strain compared to the native state.
- Suture slippage occurred in only 11% of the knotless constructs compared to 30% of the knotted constructs.

#### Takeaways

- **A knotless Bankart repair with 1.8 mm Knotless FiberTak anchors results in biomechanical performance equal to a knotted construct with low rates of suture slippage (maintenance of loop security).**
- **Knotless mattress configurations increase biomechanical performance compared to simple suture configurations. This configuration is capable of achieving strain levels that are not statistically different from the native state.**



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Biomechanical comparison of knotless all-suture anchors and knotted all-suture anchors in type II SLAP lesions: a cadaveric study. *Arthroscopy*. 2020;36(8):2094-2102. doi.org/10.1016/j.arthro.2020.04.026

- Using 20 paired cadaveric shoulders, this study compared the biomechanical performance of tensionable, knotless all-suture anchors (group A: Knotless 1.8 mm FiberTak anchor with #2 FiberWire® CL suture [Arthrex]) and knotted all-suture anchors (group B: 1.8 mm Q-Fix™ anchors [Smith & Nephew]) for the repair of type II SLAP lesions with a simulated peel-back mechanism (the long head of the biceps [LHB] tendon was loaded in a posterior direction).
- Mean load-to-repair failure was similar in groups A ( $179.99 \pm 58.42$  N) and B ( $167.83 \pm 44.27$  N,  $P = .530$ ).
- Mean load-to-ultimate failure was  $230 \pm 95.93$  N (group A) and  $229.48 \pm 78.45$  N (group B), and ( $P = .958$ ).
- Initially, both knotless and knotted repairs displayed high fixation strength.

#### Takeaway

- **All-suture anchors are smaller in diameter than solid anchors, so they can be inserted through curved guides, preserve bone stock, and facilitate postoperative imaging. Both knotless and knotted anchors performed similarly biomechanically in type II SLAP repairs.**

### Clinical Studies

Risk factors for recurrence of shoulder instability after arthroscopic Bankart repair. *J Bone Joint Surg Am*. 2006;88(8):1755-1763. doi:10.2106/JBJS.E.00817

- Risk factors for recurrence after arthroscopic Bankart repair were evaluated in 91 patients.
- “Patients who had three anchors or fewer were at higher risk for recurrent instability ( $p = 0.03$ ).”

#### Takeaway

- **Increased points of fixation reduce the risk of recurrence following arthroscopic Bankart repair. This may be facilitated by all-suture anchors, which allow more anchors per glenoid given the smaller tunnel required per each anchor.**

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Hery JY,  
Balg F,  
Ahrens P,  
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Iuchi R,  
Mae T

[Postoperative recurrence of instability due to new anterior glenoid rim fractures after arthroscopic Bankart repair.](#) *Am J Sports Med.* 2017;45(12):2840-2848.  
doi:10.1177/0363546517714476

- Retrospective comparative study of arthroscopic Bankart repairs.
  - 128 shoulders treated with 2.4 mm metal screw-in anchors
  - 129 shoulders treated with 1.4 mm suture-based soft anchors
- To evaluate glenoid defects, CT scans were performed for those who experienced recurrence.
- There was no difference in recurrence between the 2 groups.
- Recurrence decreased with an increased number of anchors.
- New glenoid fractures were observed in only 13 patients.
  - Mean of 4 anchors used in hard-body group with fracture
  - Mean of 5.8 anchors used in all-suture group with fracture

#### Takeaways

- **For arthroscopic Bankart repairs, there was no difference in recurrence between the two groups (hard-body vs all-suture anchors).**
- **There is a balance between increased points of fixation and risk for postoperative glenoid fracture due to stress risers from anchor insertion. The tolerance for this appears to be increased with all-suture anchors (due to smaller bone tunnels) based on the fact that the fractures required a greater number of all-suture anchors compared to hard-body anchors. Additionally, consideration should be given to the bone tunnel trajectory during Bankart repair (it is advisable to place divergent tunnels if possible).**

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Hatta T,  
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[Curved-guide system is useful in achieving optimized trajectory for the most inferior suture anchor during arthroscopic Bankart repair.](#) *J Shoulder Elbow Surg.* 2019;28(9):1692-1698.  
doi:10.1016/j.jse.2019.03.031

- This study compared anchor placement in arthroscopic Bankart repair using postoperative CT scans.
  - 32 anchors were placed with a straight guide
  - 9 anchors were placed with a curved guide
- Anchor perforation of the inferior glenoid was significantly lower in the curved-guide group.
  - 11% with curved guide
  - 56% with the straight guide ( $P = .02$ )

#### Takeaways

- **All-suture anchors may be placed with a curved guide, which decreases the risk of glenoid perforation in arthroscopic Bankart repair.**
- **Compared with the conventional straight guide, the curved-guide system provides optimized placement of the most inferior suture anchor during arthroscopic Bankart repair.**



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Wu WW,  
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McDonald L,  
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[Glenoid bone reaction to all-soft suture anchors used for shoulder labral repairs.](#) *J Bone Joint Surg Am.* 2018;100(14):1223-1229. doi:10.2106/JBJS.17.01169

- Glenoid bone reactions were evaluated in 30 patients who underwent arthroscopic Bankart repair with 1.4 mm all-suture anchors.
- CT scans were obtained at various time points.
  - 1 month postoperative
  - 6 months postoperative
  - 12 months postoperative
- No postoperative recurrences were observed.
- Tunnel expansion was observed in 84% of patients by the 1-year follow-up.
  - Tunnel volume was unchanged between the 6-month and 12-month time points
- Cysts were observed in only 3% of patients at final follow-up.

#### Takeaways

- **Some bone tunnel expansion is common after the use of all-suture anchors, but expansion stabilizes between 6 and 12 months, and the occurrence of cysts is very low (3%). The latter alleviates earlier concerns for cyst formation based on a canine model.**
- **Notably, previous studies have also demonstrated that tunnel expansion occurs with the hard-body anchors as well. Therefore, some tunnel expansion is normal with arthroscopic labral repair.**